Effects of Cognitive-Behavioral Music Therapy on Fatigue with Patients on a Blood and Marrow Transplantation Unit:

A Convergent Parallel Mixed Methods Effectiveness Study

A THESIS
SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL
OF THE UNIVERSITY OF MINNESOTA
BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
MASTER OF ARTS

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September 2013

Acknowledgements

This thesis would not have been possible without the tremendous amount of love, advice, and support I received from my parents and family, Tim Coleman, Renee Mungas, and the music therapy and music education graduate cohort. I would like to express my sincere gratitude to Dr. Michael J. Silverman for his professional knowledge, enthusiasm, patience, and encouragement as a supervisor and teacher. His guidance helped me during the research and writing of this thesis. I would not have achieved my academic and professional goals without his persistent drive and assistance. Thank you to the rest of my thesis defense committee, Professor Schwartzberg and Dr. Lubet, for their valuable time and for offering their expert feedback and thoughtful questions.

Personally and professionally, I have benefited greatly from the assistance of Christina Mielke, the registered nurses and nursing assistants, physicians, physical therapists, occupational therapists, and chaplains at the University of Minnesota Medical Center-Fairview Blood and Marrow Transplant unit. Thank you for your warm encouragement, laughs, and assistance in incorporating music therapy services in your everyday clinical practice. This research project would not have been possible without your support.

Dedication

This thesis is dedicated to my aunt, Connie, and the participants who I had the absolute privilege to work closely with and get to know personally during this study. Thank you for sharing your life experiences and love of music with me. You have been an inspiration and given me insight into what it means to be human—to live each day tenaciously facing incredible health challenges with every bit of physical, mental, and spiritual strength. Thank you.

Abstract

Cancer-related fatigue (CRF) is an under-treated condition frequently experienced by cancer patients that can negatively affect wellbeing both during hospitalization and after hospital discharge. The purpose of this mixed methods effectiveness study was to determine if and how cognitive-behavioral music therapy (CBMT) can reduce fatigue of hospitalized patients on an adult Blood and Marrow Transplant (BMT) unit. The researchers measured the effects of CBMT on five aspects of participants' fatigue using a convergent parallel mixed methods design. Participants ($N = 11$) were randomly assigned to experimental or wait-list control conditions and completed the Multidimensional Fatigue Inventory (Smets, Garssen, Bonke, & Haes, 1995) at pre- and posttest. Experimental participants also completed a semi-structured interview before hospital discharge. Quantitative results indicated no significant between-group differences concerning fatigue. However, experimental participants tended to have decreases in mean fatigue scores from pre- to posttest while control participants had increases in mean fatigue scores from pre- to posttest. Qualitative data tended to support quantitative data and indicated that CBMT a) influenced fatigue cognitively by increasing motivation and self-efficacy, b) influenced fatigue affectively by promoting relaxation and restful states, and c) represented a meaningful, unique, and holistic service for hospitalized BMT patients. It seems that CBMT sessions may be an effective intervention concerning various aspects of fatigue for hospitalized BMT patients. Due to the small sample size, quantitative results should be interpreted with caution. Limitations of the study, implications for clinical practice, and suggestions for future research are provided.

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List of Abbreviations

ACS…….American Cancer Society

BMT……Blood and Marrow Transplant

CB……Cognitive-Behavioral
CBMT……..Cognitive-Behavioral Music Therapy
CBT…….Cognitive-Behavioral Therapy
CRF……..Cancer-Related Fatigue

MFI……..Multidimensional Fatigue Inventory
MT……...Music Therapy

NCCN……..National Comprehensive Cancer Network
NCINIH…...National Cancer Institute at the National Institute of Health
NHLBI…….National Heart, Lung, and Blood Institute.

PI……..Primary Investigator

RCT……..Randomized Controlled Trial

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Literature Review

Cancer as a Social Problem

Globally, there are 25 million people living with cancer (Kamangar, Dores, & Anderson, 2006). Cancer drastically affects both genders as one-half of men and one-third of women in the U.S. will develop cancer during their lifetimes (American Cancer Society (ACS), 2012c). Approximately 1.6 million people were diagnosed in 2012 (ACS, 2012a) and, based from cancer prevalence rates between 2007 and 2009, 12.5 million Americans are currently living with a history of cancer (Howlader et al., 2012). Cancer has become a major social and financial problem, affecting those who are diagnosed as well as their family members, caregivers, companions, and social networks. Additionally, the U.S. Census Bureau estimated that almost 51 million Americans had no health insurance coverage, possibly preventing those diagnosed with cancer from receiving immediate health care and therefore experiencing more costly and extensive treatment later in life (ACS, 2012a). Due to population growth, longer life expectancies, and increased cancer survival rates, the number of new cancer diagnoses is expected to reach 2.6 million people by 2050 (ACS, 2012a). With the lofty prevalence of cancer, there is a heightened need for awareness towards the different types of cancer as well as available treatments.

Blood and Marrow Transplant

Cancer is a general term categorizing many diseases characterized by the uncontrolled growth and spread of abnormal and malfunctioning cells within the body (ACS, 2012c). Both internal and external factors can contribute to the development of the disease and death may result if cancer is untreated (ACS, 2012c). Various types of cancer are typically treated with surgery, radiation, chemotherapy, hormone therapy, biological therapy, and targeted therapy (ACS, 2012c). When certain types of cancer, including lymphoma, leukemia, myeloma, breast cancer, severe blood diseases, sickle cell anemia, and immune-deficiency diseases, prevent the body from producing enough healthy blood cells (National Heart, Lung, and Blood Institute [NHLBI], 2011), patients are often treated with a blood and marrow stem cell transplant (BMT). Following more conventional treatments such as radiation, chemotherapy, or anticancer drugs, a BMT procedure replaces a patient's abnormal stem cells with healthy ones. Healthy stem cells are found in bone marrow and in the blood or umbilical cord that develop into red blood cells, white blood cells, and platelets that carry out specific needs for the body (NHLBI, 2011). Depending on a patient's general health, medical situation, and whether pharmacological treatments are needed, hospitalization may occur for weeks or even months after a BMT (NHLBI, 2011).

Symptoms of Cancer and Side Effects of Cancer Treatment

Due to the extensive procedures surrounding cancer treatments, patients frequently experience uncomfortable side effects from medications or procedures. According to the NHLBI (2011), high doses of chemotherapy and radiation therapy can

cause side effects including nausea, vomiting, diarrhea, and tiredness. Additionally, painful sores in the mouth, intestinal cramps, skin rashes, hair loss, liver damage, and pneumonia affecting certain tissues in the lungs can occur a few days after a BMT (NHLBI, 2011). These side effects can be painful, uncomfortable, and represent a serious concern (NHLBI, 2011). Accompanying these side effects, patients may also experience certain symptoms of cancer. Common general symptoms of cancer can include weight loss, fever, fatigue, pain, and skin changes (ACS, 2012b). The combination of cancer-related side effects and symptoms can adversely affect physical, cognitive, emotional, social, and spiritual wellbeing.

Prevalence and Causes of Cancer-Related Fatigue

Fatigue represents one of the most commonly reported symptoms and side effects of cancer patients (Hofman, Ryan, Figueroa-Moseley, Jean-Pierre, & Morrow, 2007; Lawrence, Kupelnick, Miller, Devine, & Lau, 2004; Mock, 2001; Nail & Winningham, 1993; Stone, Richards, & Hardy, 1998; Winningham et al., 1994). Up to 91% of cancer patients experienced cancer-related fatigue (CRF) (Lawrence et al., 2004). Fatigue can negatively impact cancer treatment dose administration, patient quality of life, and physical, emotional, and social functioning (Given et al., 2002; Hann et al., 2006; Hofman et al., 2007; Janda et al., 2000; Mock, McCorkle, Ropka, Pickett, & Poniatowski, 2002). CRF is characterized by diminished energy, generalized weakness, diminished mental concentration, insomnia or hypersomnia, and emotional reactivity (Mitchell, 2011; Mock et al., 2000). Schubert, Hong, Natarajan, Mills, and Dimsdale (2007) conducted a quantitative review concerning the association between fatigue and inflammatory marker levels in cancer patients and found perceived fatigue as more

troublesome to cancer patients than cancer-related pain, nausea, or vomiting. Kamangar et al. (2006) noted that each year, over 10 million new cases of adults are diagnosed with CRF worldwide. Thus, CRF is a common, under-treated, and debilitating symptom of patients with cancer and cancer survivors (Bower et al., 2006; Mitchell, 2011; Mustian et al., 2007).

The National Comprehensive Cancer Network (NCCN) (2012) defined CRF as a distressing, persistent, and subjective sense of tiredness or exhaustion related to cancer or cancer treatment that is not proportional to recent activity and interferes with usual functioning. CRF can be experienced at different stages during and after cancer treatment (Goedendorp, Gielissen, Verhagen, & Bleijenberg, 2009). The National Cancer Institute at the National Institutes of Health (NCINIH) (2012) noted that only definite causal mechanism of CRF demonstrated through research is chemotherapy-induced anemia. However, the specific cause of fatigue is still unknown (NCCN, 2013). Therefore, symptoms of fatigue such as anemia or depression are sometimes initially treated as means to reduce the degree of fatigue (NCINIH, 2012). Mustian et al. (2007) described that both biological and psychosocial factors such as self-efficacy, causal attributions, expectancy, coping, and social support may contribute to the multidimensional experience of CRF. Regardless, no single or definite cause has been identified in cancer patients other than the cancer and the treatment itself (Goedendorp et al., 2009). Thus, despite the magnitude of CRF and its consequences, the cause of CRF is still unclear.

Concerning the impact of CRF on the lives of cancer patients, Curt et al. (2007) revealed that 80% to 99% of cancer patients who underwent chemotherapy or

radiotherapy treatment reported fatigue. Additionally, Schubert et al. (2007) found that fatigue affected between 70% to 100% of patients with cancer undergoing radio- or chemotherapy and that the CRF can persist for months or even years after treatment. Since most BMT patients will undergo some form of treatment such as chemotherapy, radiation therapy, or both before receiving a BMT (NCINIH, 2010), BMT patients are likely to experience similar negative side effects including CRF. Andrykowski, Henslee, and Farrall (1989) found fatigue was more severe in patients who had undergone a BMT after the age of 30 and experienced greater difficulty in physical and social functioning with older age at transplant. Moreover, Baker et al. (1994) revealed that after receiving a BMT, fatigue was significantly correlated with worse social support and additional problems in current functioning. Thus, there is a high probability that BMT patients will experience certain aspects of CRF at some point during their recovery and survivorship and interventions are warranted.

Current Treatments for CRF

Treatment for managing patient CRF involves pharmacological or non-pharmacological therapies and interventions. In a review of pharmacological therapies designed to treat CRF, Minton, Stone, Richardson, Sharpe, and Hotopf (2008) found that drugs treating anemia – such as erythropoietin and darbopoetin – can be effective in managing CRF for patients who are anemic due to chemotherapy. However, these pharmacological treatments raise safety concerns due to notable adverse effects including increased mortality and tumor progression (Bennett et al., 2008; Khuri, 2007). According to the Fatigue Coalition, 40% of cancer patients were not offered any recommendations

for CRF management and the most common treatment recommendations were bed rest and relaxation (Curt et al., 2007).

There is a limited evidence base regarding self-relief strategies treating fatigue for cancer patients. Although there has been a recent increase of literature and randomized controlled trials in mainstream oncology focusing on CRF, a recent survey from the NCCN identified that one-third of clinicians had a low level of awareness towards pre-existing recommendations for CRF and pharmacologic and non-pharmacologic interventions that may be used for treatment (Hinkel, 2012). Researchers issued diagnostic criteria to standardize the assessment of CRF, but the criteria have not become widely accepted or implemented by clinicians (Andrykowski, Schmidt, Salsman, Beacham, & Jacobsen, 2005; Cella, Peterman, Breitbart, & Curt, 1998; Sadler et al., 2001; Van Belle et al., 2005). Although clinicians have continued to recommend bed rest and relaxation, researchers have also begun to study and develop alternative non-pharmacological interventions that exhibit effectiveness in treating CRF.

Non-Pharmacological Treatments and Evidence for CRF

Current non-pharmacological interventions that demonstrate reductions of CRF consist of psychosocial therapies that aid in adjusting cognition, emotions, behavior, the social context, or a combination of these (Goedendorp et al., 2009). Psychosocial interventions, such as cognitive-behavioral (CB) treatments, can be effective in improving psychological and behavioral adjustments (Compass, Haaga, Keefe, Leitenberg, & Williams, 1998) during cancer treatment and survivorship. The panel of experts at the NCCN (2013) investigated a wide range of pharmacologic and non-pharmacologic interventions treating CRF and revealed that exercise, psychoeducational

and psychosocial interventions, and cognitive-behavioral therapy (CBT) for insomnia have shown effectiveness in treating CRF. Mitchell (2011) noted that psychoeducational interventions can be effective, including anticipatory guidance concerning patterns of fatigue and recommendations for self-management, counseling, supportive psychotherapy, and coordination of care. Researchers also found CB techniques to have positive effects on reducing fatigue via self-management strategies towards sleep quality, relaxation training, and cognitive-emotional arousal (Duijts et al., 2011; Goedendorp et al., 2009; Jacobsen, Donovan, Vadaparampil, & Small, 2007; Montgomery et al., 2009). Additionally, authors of the NCCN's (2013) guidelines outlining the best level of care for effective management of CRF recommended counseling in coping with fatigue, using forms of active cancer treatment including physical-based therapies, and psychosocial interventions.

As researchers enlarge the literature base of non-pharmacological interventions treating CRF, educational interventions and psychological support play a crucial role in encouraging coping skills in cancer patients with fatigue (Mitchell, 2011; NCCN, 2013). Kangas et al. (2008) conducted a systematic and meta-analytic review concerning non-pharmacological therapies to reduce CRF and found that exercise and psychological interventions involving multimodal exercise and walking programs, restorative approaches, supportive-expressive, and CB psychosocial interventions provided reductions in CRF. Goedendorp et al. (2009) found significantly higher effectiveness of psychosocial interventions specific for fatigue – including education on fatigue, teaching self-care or coping techniques, and learning activity management – than interventions not specific for fatigue. Regarding cancer and management of symptoms, Pothoulaki,

MacDonald, and Flowers (2012) found that physical, therapeutic, and psychological interventions are needed in order to promote overall quality of life. There is a necessity for a multidimensional and individually tailored treatment plan in order to identify management strategies and to utilize an intervention as a distraction or an aid for patients to refocus their perspectives regarding their fatigue (Mitchell, 2011). Overall, additional research is needed to contribute to the body of evidence particularly concerning self-relief interventions for patients.

Music Therapy and Cancer Care

Music Therapy (MT) is the psychosocial practice of utilizing music as means to improve and support non-musical goals pertaining to clients' physiological, psychosocial, cognitive, emotional, and spiritual needs. Integrating with conventional cancer care, MT is "the creative and professionally informed use of music in a therapeutic relationship with people identified as needing physical, psychosocial, or spiritual help" (McDougal-Miller & O'Callaghan, 2010, p. 217).

Researchers and clinicians have demonstrated that MT interventions can improve health outcomes in surgery, cardiology, obstetrics, and oncology (Aldridge, 1993; Burns, Sledge, Fuller, Daggy, & Monahan, 2005). Within inpatient and outpatient oncology settings, MT can offer "a sense of normalcy, wholeness, hopefulness, perspective, transcendence, or a vision of health to patients and their families and friends during their cancer treatment process" (McDougal-Miller & O'Callaghan, 2010, p. 217). Burns (2012) indicated preliminary evidence towards the benefits of music-based interventions for a multitude of health-related outcomes in cancer care and treatment. Pothoulaki et al.

(2012) indicated positive effects of MT on a range of psychological and physiological responses, such as reducing stress and anxiety levels, improving mood, influencing physiological responses relating to side effects of chemotherapy and the immune system, enhancing overall wellbeing, and creating positive attitudes towards life. Bradt, Dileo, Grocke, and Magill (2011) conducted a systematic and meta-analytic review examining music-based interventions' improvement of psychological and physical outcomes of cancer patients and found that music interventions can have a beneficial effect on anxiety and patient quality of life. The researchers also indicated a positive impact on mood and pain as well as small reductions in heart rate, respiratory rate, and blood pressure (Bradt et al., 2011). In a meta-analytic review examining the effects of music interventions on psychological and physical outcome measures of cancer patients, Zhang et al. (2012) revealed that music interventions are well received by patients and associated with improved psychological outcomes. Zhang et al. (2012) suggested high-quality trials are warranted in order to further determine the effects of music interventions on cancer patients. Ultimately, MT and creative forms of expression may enable patients who are affected by chronic illnesses, including cancer, to regain their sense of autonomy and control over their immediate environments (Pothoulaki et al., 2012).

Music Therapy Treatment on the BMT unit

To date, there is limited MT research documenting the benefits of MT specifically for patients recovering from a BMT. However, authors who conducted preliminary investigations have found positive results (Anderson, Pitts, & Silverman, 2012; Boldt, 1996; Cassileth, Vickers, & Magill, 2003; Sahler, Hunter, & Liesveld, 2003). Anderson

et al. (2012) found lower fatigue levels and higher mean energy scores for experimental participants who received MT services compared to control participants. Boldt (1996) also revealed decreased fatigue levels as well as increased relaxation and endurance levels for BMT patients who received MT. Sahler et al. (2003) found patients reported a significant decrease in self-reported pain and nausea ratings following twice-weekly MT sessions. Additionally, Cassileth et al. (2003) found participants in their experimental group scored 28% lower on the combined anxiety and depression scale and 37% lower on the total mood disturbance scale after they received three to seven group MT sessions. Various authors have recommended that future BMT and MT investigators study larger sample sizes and increased MT doses to determine if treatment dosage relates to superior treatment outcomes (Anderson et al., 2012; Boldt, 1996).

Overview of the CRF and MT Literature

CRF is a prevalent and under-treated symptom frequently experienced by cancer patients that negatively affects physical, cognitive, emotional, and spiritual wellbeing both during hospitalization and after being discharged from the hospital. While there is an awareness of CRF, there is limited evidence regarding the most applicable and effective treatments addressing CRF. CRF is a common complaint and symptom of cancer that is not easily measurable due to its subjectivity. Moreover, medical staffs do not commonly assess CRF upon hospital admission or discharge. Although there is inadequate and inconclusive research (NCCN, 2013), clinical awareness to CRF and its impact on the quality of life has grown (Hann et al., 1998). Previous researchers and authors found non-pharmacological therapies involving psychosocial interventions, psychoeducational support, exercise or active interventions, and CB techniques to reduce

CRF of cancer patients (Goedendorp et al., 2009; Jacobsen et al., 2007; Kangas et al., 2008; NCCN, 2013).

Concerning MT interventions addressing CRF, researchers and clinicians found MT interventions to be effective (Anderson et al., 2012; Pothoulaki et al., 2012; Zhang et al., 2012). However, there is limited literature regarding the details concerning *how* and *why* these interventions work (Pothoulaki et al., 2012). Researchers examining the effects of music-based interventions with cancer patients have focused predominantly on anxiety but additional studies are needed to investigate other relevant outcomes including CRF (Bradt et al., 2011). Additionally, previous researchers within MT, oncology, and nursing professions have recommended further research demonstrating clear differences between intervention and control conditions and to examine the relationships between frequency and duration of music interventions and treatment effects (Bradt et al., 2011; Clark et al., 2006; Chaput-McGovern & Silverman, 2012; Mitchell, 2011; Pothoulaki et al., 2012).

To date, MT research on BMT units is limited. However, researchers who conducted preliminary studies have found positive results (Anderson et al., 2012; Boldt, 1996; Cassileth et al., 2003; Sahler et al., 2003). Ultimately, patients with cancer need additional emotional support, education, and engagement in positive strategies to increase their abilities to manage their illnesses (Robb, Burns, & Carpenter, 2011). However, there is still a gap in the literature regarding *if*, *how*, and *why* MT interventions affect CRF (Bradt et al., 2011). In the contemporary era of evidence-based practice, there is a need for additional research investigating the effects of MT on multidimensional aspects of fatigue with this population. Therefore, the purpose of the current mixed methods

effectiveness study was to determine if and how cognitive-behavioral music therapy (CBMT) sessions can reduce fatigue in hospitalized patients on a blood and marrow transplant unit. The questions guiding the present study were:

1. Can cognitive-behavioral music therapy reduce various aspects of cancer-related fatigue?
2. How might cognitive-behavioral music therapy reduce various aspects of cancer-related fatigue?

Method

Research Participants

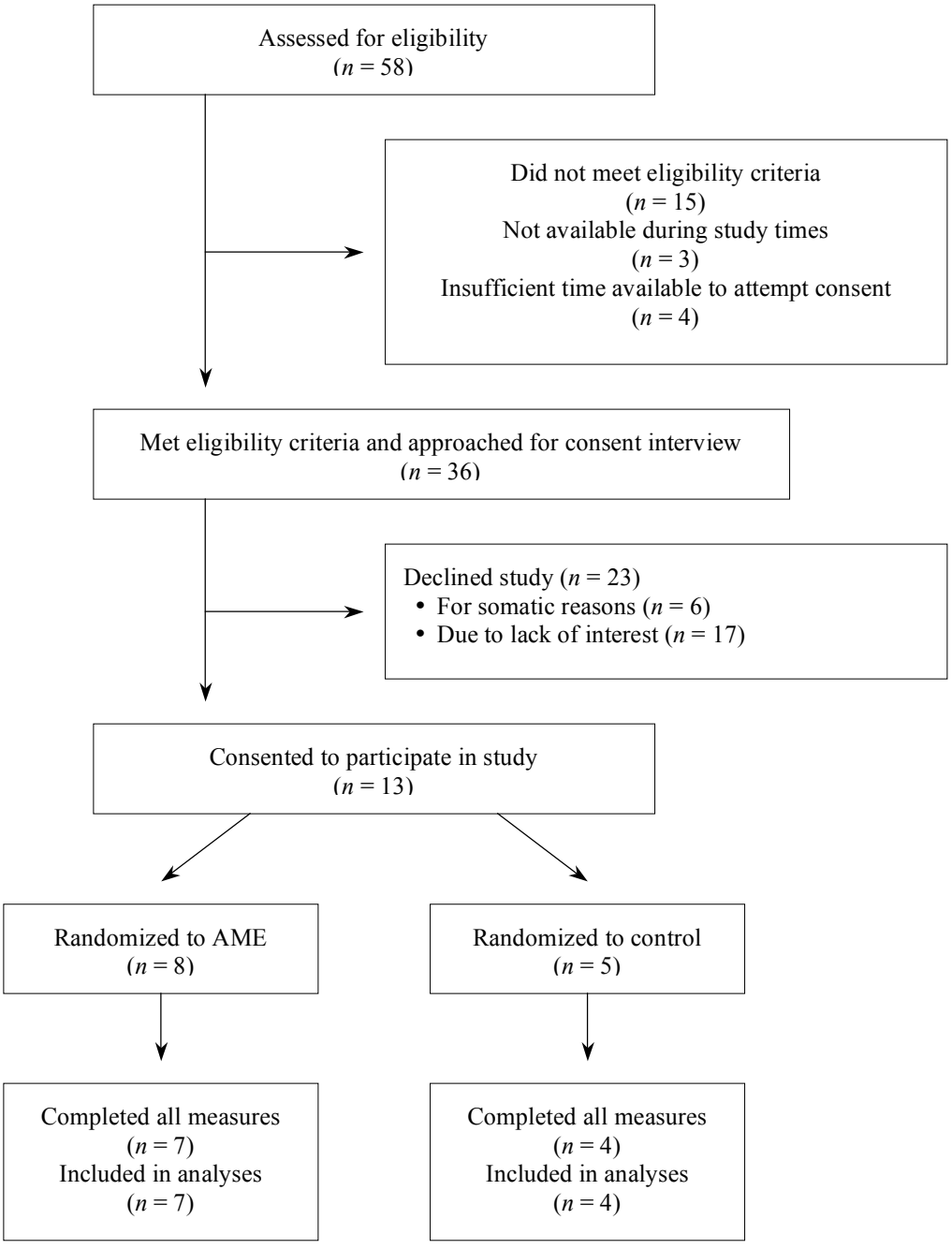
Participants ($N = 11$) were hospitalized inpatients on the adult Blood and Marrow Transplantation (BMT) unit of a large teaching hospital in the mid-western region of the United States. Patients on this unit were recovering from a current or previous BMT, returning to the hospital due to infections or other complications, or were undergoing chemotherapy, radiation, or both chemotherapy and radiation in preparation for their BMT procedure. Thus, in an attempt to be as inclusive as possible in this effectiveness study, all hospitalized adult patients ages 18 and older on the BMT unit who were post-transplant during the study period and who could read and understand English were eligible for study inclusion. Patients who did not meet the eligibility criteria did not speak or write English, were not available during study times, or declined the study due to somatic reasons or lack of interest were excluded from the study. There was no penalty if a patient chose not to participate in the study, and choosing not to participate

did not affect a patient's treatment in any way. Participants did not receive payment for participating in this study.

Thirty-six patients who met initial inclusion criteria were asked to participate in the study. Twenty-three patients declined and a total of 13 participants voluntarily consented to participate in the study. A participant flow chart is illustrated in Figure 1.

Figure 1

Participant Flow Chart



Demographic descriptive statistics concerning participants' age, number of days in the hospital prior to research contact, and MT dose are depicted in Table 1. To

determine if there were between-group differences in demographics, the researchers conducted *t*-tests for independent samples. No result was significant, $p > .05$. Demographic frequency data concerning sex, race/ethnicity, and cancer type are depicted in Table 2. The researchers conducted Chi-Square tests to determine if there were between-group demographic frequency differences. No result was significant, $p > .05$.

Table 1

Demographic Descriptive Statistics by Group

	Experimental Group $n = 7$		Control Group $n = 4$	
Demographic	*M*	*SD*	*M*	*SD*
Age	46.14	15.46	53.25	7.14
Days in the hospital	21.71	15.91	9.75	3.77
Dose	5.00	3.65	-	-

Table 2

Frequencies of Sex, Race/Ethnicity, and Cancer Type

		Experimental Group (n = 7)	Control Group (n = 4)
Sex			
	Female	3	0
	Male	4	4
Race/Ethnicity			
	Caucasian	7	3
	Other	0	1
Cancer type			
	ALL	2	0
	AML	1	1
	CLL	1	1
	Hodgkin Disease	1	0
	Multiple Myeloma	0	1
	Non-Hodgkin Lymphoma	1	1
	Lymphoma (Not Specified)	1	0

Instruments

The researchers utilized the 20-item Multidimensional Fatigue Inventory (MFI; Smets, Garssen, Bonke, & Haes, 1995) to measure five aspects of fatigue: General fatigue, physical fatigue, reduced activity, reduced motivation, and mental fatigue. The general fatigue subscale applies broader statements about fatigue and decreased

functioning based on both physical and psychological aspects of fatigue. Physical fatigue considers physical perception related to fatigue while mental fatigue concerns cognitive functioning. Reduced activity alludes to the effect of physical and psychological factors on the level of activity, and reduced motivation refers to the level of motivation for starting any activity (Lin et al., 2009). The MFI subscales each contain four items that pertain to how the patient has felt lately (Smets et al., 1995). Items are scored on a response scale consisting of five boxes, ranging from "yes, that is true" to "no, that is not true" (Smets et al., 1995). Each subscale ranges from 4 to 20 where higher scores indicate higher levels of fatigue (Smets et al., 1995). The MFI is depicted in Appendix A.

According to researchers who conducted a study designed to validate the MFI in U.S. adult populations, the instrument had no item redundancy and the standardized Cronbach alphas values were high: General fatigue: 0.83; physical fatigue: 0.81; reduced activity: 0.82; reduced motivation: 0.70; and mental fatigue: 0.86 (Lin et al., 2009). Lin et al. (2009) found good internal consistency (Cronbach's alpha > 0.80) for the general, physical, and mental fatigue aspects and adequate reliability for the reduced activity and motivation aspects (Cronbach's alpha > 0.65). Additionally, Meek et al. (2000) found test-retest correlations were relatively reliable and Cronbach's alpha scores were acceptable, > 0.70. The MFI was designed to capture differences in CRF over a period of time and demonstrated persistence of its constructs after completion of initial treatment in a range of cancers (Jean-Pierre et al., 2007).

In an attempt to understand how MT may have influenced fatigue, the principal investigator (PI) administered a semi-structured individual interview consisting of four

open-ended questions to experimental participants. This interview occurred after participants' terminal MT session and before being discharged from the hospital. The PI recorded the interview using Perception System's Recorder Pro 2.0 on an iPad. The PI asked participants questions inquiring how the cognitive-behavioral music therapy (CBMT) interventions affected various aspects of their fatigue, how MT services were the same and differed from other psychosocial services, therapies, treatments on the BMT unit, and how they would describe MT to a friend. Each interview lasted approximately 5- to 10-min. The interview questions are depicted in Appendix B.

Other materials included MT session materials, such as the PI's guitar (Simon and Patrick Luthier Woodland Folk Cedar steel-string) and music repertoire on an iPad or printed on paper in a bound songbook. Data recording materials included a digital voice recorder, iPad, informed consent forms, inventory questionnaires, and pens.

Design

The researchers utilized a convergent parallel design composed of a randomized controlled trial (RCT) and a semi-structured interview. To further evidence-based practice within MT research, integrating objective data with subjective data can provide an expansion of evidence used to better evaluate the research question and to gain a greater understanding of complex phenomenon (Bradt, Burns, & Creswell, 2013).

The quantitative component of the study was comprised of an RCT with an experimental group and a wait-list control group. Participants were randomly assigned via a computer program to either the experimental (n = 7) or wait-list control group (n = 4). Participants completed the MFI at pre- and posttest. Experimental participants completed the pre- and posttests before and after MT services. Wait-list control

participants completed the posttest before they left the hospital, after which they received MT services.

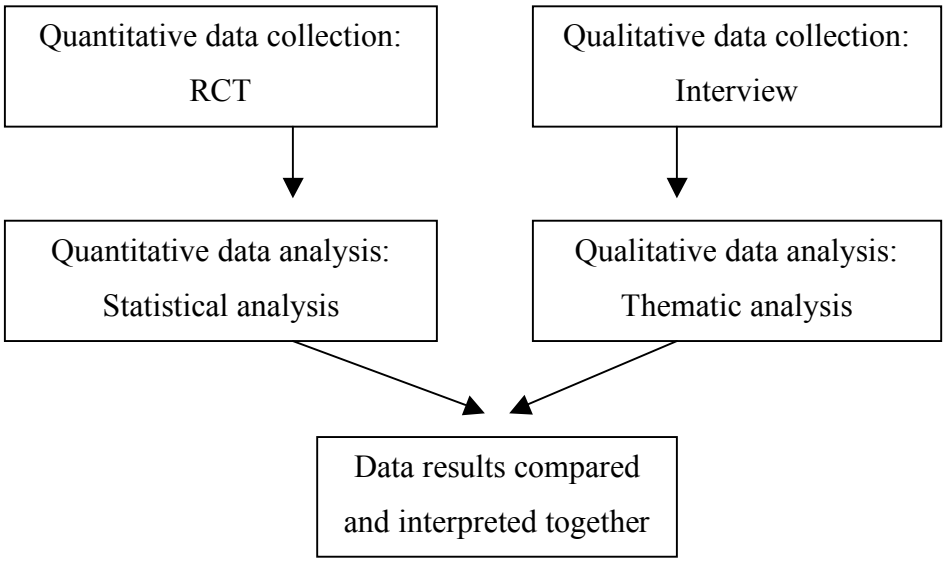
The researchers utilized a qualitative component to counterbalance any limitations an RCT may present (Bradt et al., 2013; Creswell & Plano Clark, 2011). An RCT does not accurately depict the treatment decision-making process of a music therapist, does not describe *how* or *why* a specific intervention may be effective, and is not completely transparent as means to implement an intervention into every day clinical practice (Bradt et al., 2013). Upon experimental participants' MFI completion of the posttest, the PI conducted a brief semi-structured interview with each participant in an attempt to further explain and compliment results from the quantitative study. Four open-ended questions surrounding the participants' experiences and perspectives on CBMT and aspects of their fatigue were inquired, recorded, and transcribed as qualitative data for the study. A six-phase thematic analysis was utilized to determine the most efficient description and representation of the data set (Braun & Clarke, 2006). In support of thematic analysis, Boyatzis (1998) reported that the analysis provides a structure to describe the data set in a detailed manner and interprets various dimensions addressing the research topic. The thematic analysis led to a more in-depth understanding as to how CBMT may be an effective treatment concerning fatigue for hospitalized BMT patients and how certain factors may have limited or increased benefits.

Adhering to a convergent parallel design, quantitative and qualitative components were conducted, collected, and analyzed separately during the same phase of the research process and shared equal emphasis (Creswell & Plano Clark, 2011). Both data sets were then merged during the overall interpretation in order to evaluate the ways the results

converged with and diverged from each other (Creswell & Plano Clark, 2011). According to Creswell and Zhang (2009), the convergent parallel design is implemented "to understand a construct from the perspective of two different types of evidence" (p. 614). The researchers utilized this design to investigate multiple aspects of and gather complementary data concerning the multifaceted characteristics of fatigue (Creswell & Plano Clark, 2011). Figure 2 depicts the research process chosen by the researchers in this study.

Figure 2

Convergent Parallel Study design



Procedure

In an attempt to be as inclusive as possible and accurately represent contemporary clinical practice, every post-transplant hospitalized adult patient (ages 18 and older) on the BMT unit during the study period was eligible for study inclusion. The PI provided informed consent and information regarding the study, verbally and in writing, to the participants (see Appendix C). Once informed consent was obtained, participants were

randomized via a computer program into experimental or control arms. In the experimental group, participants completed the MFI as a pre-test at the beginning of their hospital stay, received a MT session each week day, and completed the MFI again as a posttest before being discharged from the hospital. The researchers utilized a one-to-one semi-structured interview with experimental participants to collect qualitative data in order to better understand participants' experiences and perspectives regarding how the CBMT interventions affected fatigue. In the wait-list control group, participants completed the MFI pre-test at the beginning of their hospital stay, waited the duration of their hospitalization, completed the MFI as a post-test before being discharged, and then received a MT session. During the MT sessions, the PI discussed participant music preferences along with clinical problems, current coping skills related to CRF, and coping with cancer. The researchers utilized a MT protocol within a CB approach as depicted in Appendix D. Session duration was approximately 30- to 45-min and consisted of patient-preferred live music using the guitar and voice along with CB techniques concerning CRF and coping with cancer.

The university and hospital shared an Institutional Review Board (IRB) that approved the study before data collection initiated. The researchers completed all necessary and required research training to conduct this study and provide MT on the BMT unit.

Protocol Development

Importance of protocols in music therapy. Previous researchers have demonstrated that MT can be an effective treatment supporting cancer patients during their treatment processes (Burns et al., 2005). However, no systematic MT procedure

currently exists for individuals within specific clinical contexts (Burns et al., 2005). Researchers have noted that current MT studies often lack proper descriptions concerning specific music-based interventions used in sessions that enable studies to be replicated, conclusive, or relevant (Evans, 2002; Pothoulaki, MacDonald, & Flowers, 2006; Robb, Burns, & Carpenter, 2011). MT protocols may be used as a structured – yet flexible – guideline for hospitalized patients targeting a particular outcome to increase benefits and replicability. Detailed intervention research reporting remains crucial for cross-study comparisons, replication, generalizations, and integration into practice (Robb et al., 2011).

Patient-preferred live music (PPLM). Music-based interventions that have shown effectiveness with cancer patients include patient-preferred music when compared to therapist-preferred music and live music when compared to pre-recorded music. Researchers have found that patient-preferred music can reduce anxiety (Walworth, 2003) and increase patients' tolerance and perceived control over pain (Mitchell, MacDonald, & Brodie, 2006). Cassileth et al. (2003) compared live music with pre-recorded music and found that live music was more effective in reducing anxiety and had greater immediacy and emotional impact when compared to pre-recorded music. Additionally, Standley (2000) found reduced patient anxiety levels and increased immune responses when using live music when compared to pre-recorded music in MT sessions. In contemporary evidence-based practice, there is an emphasis towards assessing patients' problems, needs, values, and preferences in order to promote optimal health outcomes (Burns, et al., 2005) and patient-preferred music can meet this need.

Previous researchers indicated that cancer patients often prefer receptive MT interventions as opposed to active MT interventions (Burns et al., 2005; Chaput-McGovern & Silverman, 2012; O'Callaghan & Colegrove, 1998). The patient might make a number of decisions regarding the MT session – choice of song, tempo, genre, treatment type, or length of intervention or session – potentially providing a sense of control, mastery, and autonomy, subsequently affecting emotional states. According to evidence-based practice models, patients' values and preferences concerning interventions should be integrated into clinical decision-making. Thus, pending individual preferences, PPLM may represent a component of evidence-based practice in medical settings.

Cognitive-behavioral therapy (CBT). CBT involves cognitive processing to help a patient problem solve or cope with emotional, social, or interpersonal issues (Register & Hilliard, 2008). The CB approach within MT is dependent on a patient's physical, psychosocial, emotional, and spiritual status as well as contextual factors within the hospital (Lewis, 1999). Previous authors indicated CB techniques involving psychoeducational interventions and psychological support positively impacted and reduced CRF (Goedendorp et al., 2009; Kangas et al.'s, 2008; Montgomery et al., 2009). Therefore, the current investigators incorporated a CB approach to illness management strategies and coping skills regarding the multidimensional aspects of CRF. The current researchers intended for the information learned within MT sessions to generalize to daily routines outside of sessions both during and after hospitalization. Moreover, it was hoped that beneficial effects resultant of MT sessions would be maintained over an extended period of time due to heightened senses of autonomy, control, and

independence. To apply and generalize newly acquired knowledge and practice exercises outside of MT sessions, the PI distributed a Daily Endeavor card (see Appendix E) after each MT session as an idiosyncratic fatigue-based task for experimental participants.

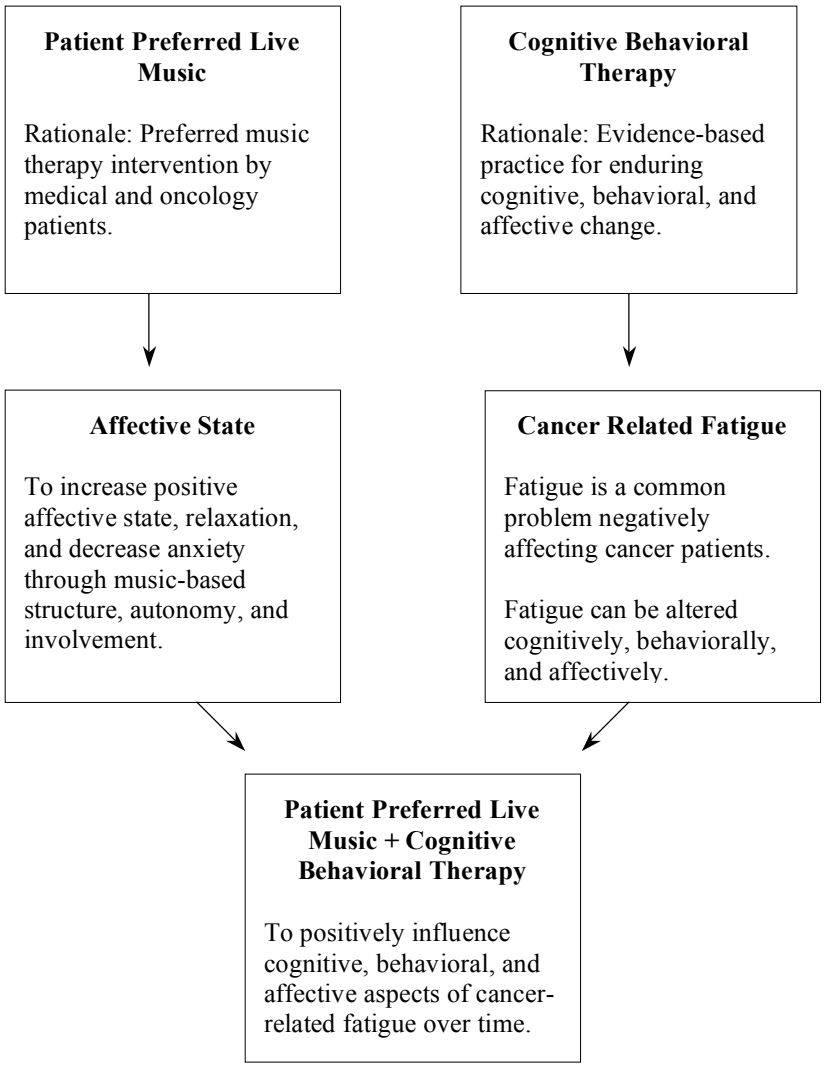
Integration of PPLM and CBMT. The CBMT protocol represents an integration of PPLM with CBT in order to reduce CRF and teach patients to independently manage CRF. In order to specifically focus on fatigue of hospitalized BMT patients, a CBT model was applied to enhance both immediate and long-term MT effects during and after patient hospitalization. While authors have noted that receptive MT can have immediate positive effects and is often preferred by cancer patients (McDougal-Miller & O'Callaghan, 2010), the current researchers also desired to increase patient involvement to enhance participant engagement and improve clinical outcomes. Cognitive information processing and emotional states can combine to influence behavior and behavior change (Kendall, 2012). Behavioral alterations can also have cognitive repercussions as Brody et al. (1989) found that patients who reported partaking an active role in their treatment reported lower levels of illness concern and an enhanced sense of control over their illness. Additionally, Standley (2000) suggested enhanced benefits when music interventions shift patient involvement from receptive listening to more active engagement across multiple sessions. More passive and receptive music-based interventions may promote self-regulation and structure and, once stabilized, patients can move towards a more interactive approach designed to develop new cognitive coping strategies, such as "exploring the meaning of cancer or behavioral coping strategies to manage symptom distress" (Burns et al., 2005, p. 196).

Intervention theory. The PI enrolled in a Psychiatric MT course during her graduate academic training and learned about the application of CB and psychoeducational interventions within a MT setting. Applying CB and psychoeducation for illness management to an oncology setting involved increasing a patient's knowledge of his or her illness, symptoms, treatment, and coping with negative affective states and symptoms. To develop the CBMT protocol, the researchers repeatedly met, discussed, and examined the protocol and supporting theories with intentions to design a practical and flexible guide for the current study and future MT clinicians. The PI also presented the CBMT protocol to classmates in a graduate Medical MT course to receive critical feedback and suggestions for usability, clarification, and replication.

The researchers of the current study developed the CBMT protocol to educate patients on CRF, assist in increasing coping strategies to reduce their fatigue without the music therapist present, and ultimately influence the multidimensional aspects of CRF in hospitalized BMT patients. The intervention theory guiding the current CBMT protocol is depicted in Figure 3.

Figure 3

Intervention Theory



Results

Quantitative Analyses

To determine if there were between-group differences in dependent measures, the researchers utilized Mann-Whitney *U* Tests with MFI subscale scores as the dependent measures and group as the fixed factor in SPSS Version 19.0. Results revealed no significant between-group difference in the fatigue scores (all $p > .05$) except for the pretest reduced activity subscale, $U = 1.00$, $p = .013$. In all fatigue subscales except mental fatigue, the music therapy condition had mean decreases from pre- to posttest scores. Mean fatigue levels in the control group increased across all subscales from pre- to posttest (see Figure 4). Pre- and posttest fatigue descriptive statistics are depicted in Table 3 and Mann-Whitney *U* Test statistics in Table 4.

Table 3

Pre- and Posttest Fatigue Descriptive Statistics

	Experimental Group $n = 7$				Control Group $n = 4$			
	Pre		Post		Pre		Post	
Dependent Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
General Fatigue	12.57	2.64	9.57	2.57	9.75	4.03	11.00	5.89
Physical Fatigue	13.14	3.89	10.29	2.69	9.00	3.27	11.00	4.97
Reduced Activity	14.42	2.76	10.29	4.89	8.50	3.70	12.00	5.89
Reduced Motivation	6.71	2.63	5.29	1.80	6.50	3.32	8.00	3.27
Mental Fatigue	7.71	3.86	7.86	3.80	8.75	4.35	9.50	5.80

Table 4

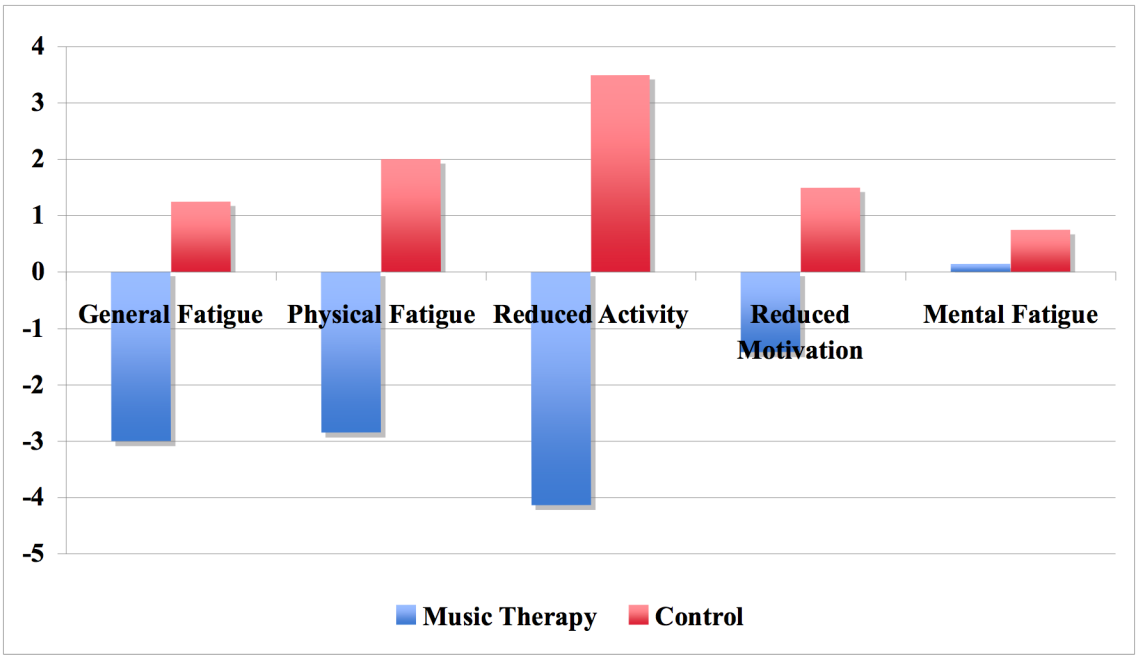
Mann-Whitney U Test Statistics

	Pretest		Posttest	
Dependent Measure	*U*	*p*	*U*	*p*
General Fatigue	8.00	.255	12.50	.775
Physical Fatigue	6.00	.125	10.00	.447
Reduced Activity*	1.00	.013	11.50	.636
Reduced Motivation	12.50	.769	7.50	.206
Mental Fatigue	12.00	.702	11.50	.633

*denotes significant between-group difference

Figure 4

Mean Change Data from Pre- to Posttest



To determine if there were relationships between dose and treatment outcomes, the researchers conducted correlational analyses between MFI posttest subscales and MT treatment dose. Results were not significant (all $p > .05$) except for the relationship between physical fatigue and dose, $p = .045$.

Qualitative Analyses

Seven experimental participants voluntarily took part in semi-structured interviews with the PI. Each interview was transcribed and then repeatedly analyzed according to the Braun and Clarke's (2006) six-phase thematic analysis, a widely used and rigorous qualitative analysis identifying and reporting patterns or themes within the data (Attride-Stirling, 2001; Boyatzis, 1998; Braun & Clarke, 2006; Tuckett, 2005). The researchers who met to ensure trustworthiness independently identified three themes. The three themes are briefly described with specific participant supporting statements below.

(A) Music therapy influenced fatigue cognitively by increasing motivation and self-efficacy

Participants frequently reported music therapy improved motivation that subsequently impacted their self-efficacy. Utilizing patient-preferred live music within a cognitive-behavioral approach motivated, stimulated, energized, and changed participants' cognitions that ultimately led to an enhanced self-efficacy and reduction in CRF. With this heightened belief of ability, participants reported that they were motivated to engage in or initiate a physical activity or exercise. While patients may not have actually engaged in physical activity or exercise, music therapy positively impacted their motivation and belief that they could accomplish the physical activity or exercise. Improved cognitions concerning motivation and self-efficacy may have reduced the multidimensional aspects of mental fatigue.

- I'd say my motivations changed. Umm, I was maybe a little bit more anxious and a little more restless before listening to the music. I was probably, um, more able, more willing, well, to kind of remain laying down, um, and feel relaxed in doing so than feeling like my skin crawling. (Participant #6)

- Yeah, it made me want to get up and get in my chair or take a shower or go to physical therapy. (Participant #7)
- It made me feel like a human again. I didn't have to lay around all the time. I got up and sat or walked around or whatever. (Participant #8)
- Um, music alwaaays motivates me, regardless of how I felt going in. Music alwaaays motivates me…It makes me feel more in control of my mind and therefore, also the body. But it helps with the mental fatigue. Alot! (Participant #9)

(B) Music therapy influenced fatigue affectively by promoting relaxation and restful states

The cognitive-behavioral music therapy approach facilitated relaxation that positively impacted participants' affective states. The patient-preferred live music within the protocol promoted a calm and relaxed affective state perhaps by distracting patients or changing their focus of attention from fatigue to the musically induced altered affective state. After music therapy sessions, participants often disclosed more positive and hopeful emotions and reported improved senses of relaxation, restfulness, and restlessness. By enhancing states of relaxation and increasing positive affective states, participants may have been better able to cope with multidimensional aspects of fatigue.

- Um, it was good to listen to the music and just kind of let my brain relax and just soak up the sound and say post-music, um, maybe felt a little fresher, optimistic, hopeful. Um, particularly knowing that I would be having another session the next day to kind of experience that too. (Participant #6)
- Put me in a whole different state of mind. I mean, not thinking about anything else but just focusing on being relaxed and the way you played. (Participant #4)
- Um, it made me think of what's out there. And not just think of myself, being down in the dumps. It makes you feel more happier. You're not sad. (Participant #8)
- [How music therapy affects mental fatigue] Wipes it out. It, uh, I say it relaxes me, especially mentally helps me relax. Um, music, especially softer music, has always had that effect on me. It calms me down…It relaxes me. It helps me rest. And even a few minutes of it makes a world of difference…[Music therapy interventions on physical fatigue] a lot the same way. Not maybe to the point that it helped with the mental fatigue, but it, uh, sometimes when you, you know, you got to rest the mind sometimes to get the body going. To get the body to rest as well and uh, just the relaxing of the mind and calming of the mind makes me at

least want to do more physically…physically and mentally. Um, because I feel better. (Participant #9)

(C) Music therapy represents a meaningful, unique, and holistic service for hospitalized BMT patients.

Participants noted that music therapy not only positively affected their fatigue, but helped them in other biopsychosocial aspects as well. Participants considered music therapy an integral treatment encompassing holistic aspects of themselves as well as their visiting family members and friends. Participants reported music therapy services were meaningful, important, and helped to improve other consequential characteristics of overall wellbeing including emotional, mental, physical, and spiritual needs. Additionally, participants disclosed that the music therapy was enjoyable, offered greater choices and control, and was distinct from physical or occupational therapy due to the ability to meet their multidimensional and holistic biopsychosocial needs.

- I think looking back on this one, I think I'll remember the musical therapy along with the physical therapy as being very helpful. You know, I may not quantitatively be able to say how much, but qualitatively, I can say that it's improved my wellbeing, I think. (Participant #6)
- It made me upgrade to being lazy to thumping and beating my feet in the floor to the music. It's good. Everybody should have it…Yes I would. I would recommend to the board to put it on…to have some kind of therapy for the patients and their family because it upgrades, uh, upbeats the family too. (Participant #8)
- They're…the similar aspects is they [all services, therapies, and treatments on the BMT unit] are all geared towards making you feel better. You know. The physical therapy, the occupational therapy, all the medical treatments, everything are geared to getting your body healthy again. The music therapy helped me get my mind healthy again. And that is every bit as important. You know, I mean, working on the exercise bike is great for the physical recovery. Doesn't do a darn thing for me mentally. But the music therapy heals me mentally, spiritually, and that all has to be part of the overall physical plan. You know, that's where…you know, as the song says, 'All the world's a stage and we each must play our part.' And the music has every bit as much of a part as the physical therapy…but music has always had a good effect on me, my emotions, my physical and mental wellbeing…and these sessions are no different. I just, I feel so much better. It,

uh, honestly, I honestly think it's helped me heal. In all honesty, I really do think it's helped me heal because it's got my mind more at peace…It just makes everything worthwhile. It makes it so much easier to recover from something because, like I say, it helps mentally, spiritually, you name it. You know, it can relax you. It can vitalize you. It can, you know, you can do so many different things that physical and occupational therapy just can't touch. (Participant #9)

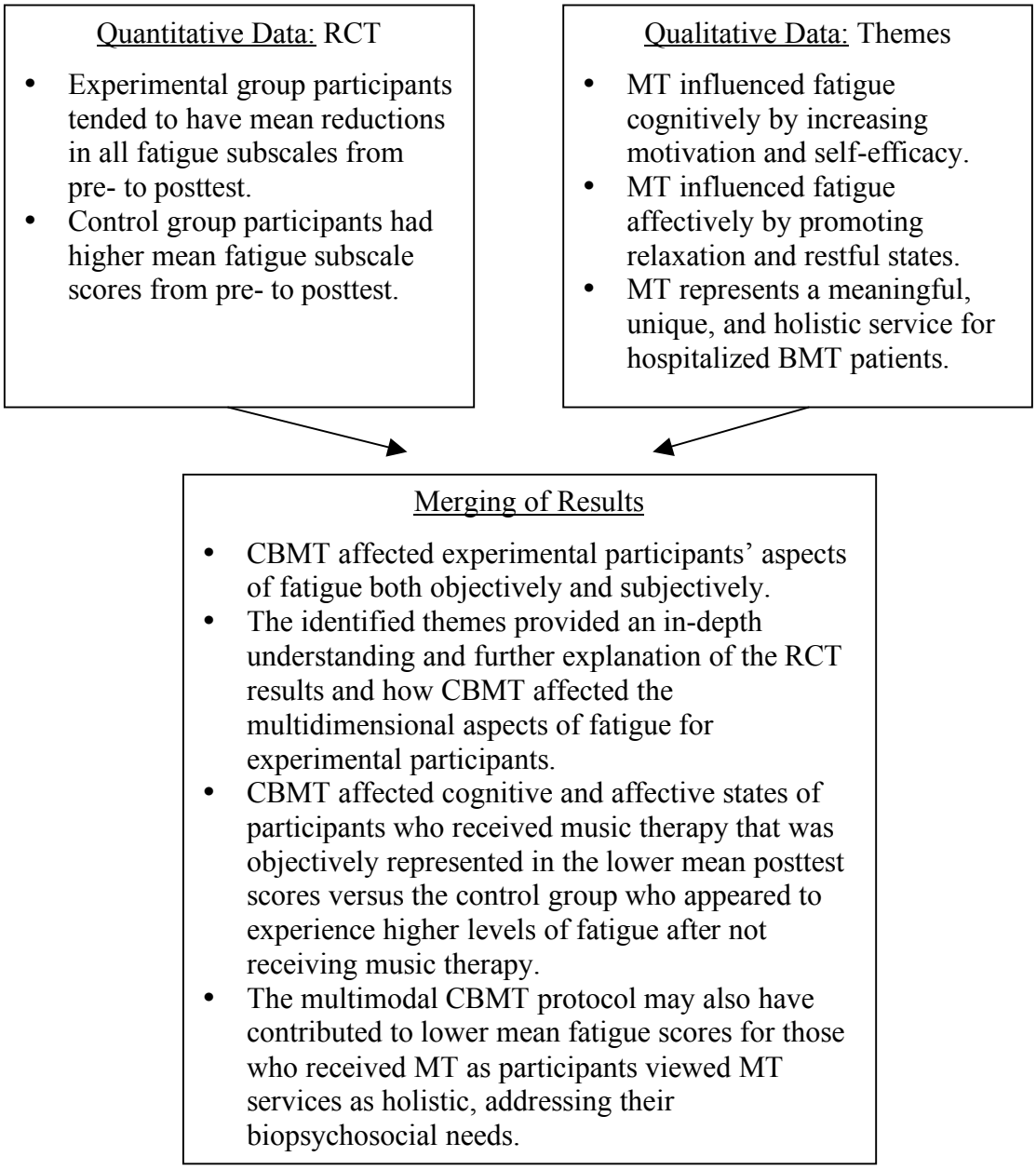
- I think it helps me…obviously relax and learn that music is actually a really big part of the world. I don't think people really take advantage for. You know, like they don't think music is going to help them through things, but it really does…They're [music therapy interventions] more fun…there's more to do, I guess. More to listen to. More things you can pick on your own…That they [music therapists] are able to give their emotions through music and not be judged. (Participant #12)

Merging Quantitative and Qualitative Results

CBMT reduced various aspects of fatigue both objectively and subjectively. CBMT increased motivation and self-efficacy, promoted relaxation and restful states, and improved consequential and holistic aspects of wellbeing including cognitive, emotional, physical, and spiritual needs. The experimental participants' mean fatigue posttest scores can be further explained by the identified themes, producing a greater in-depth understanding as to how CBMT affected the multidimensional aspects of fatigue in hospitalized BMT patients. The interpretation of merged data from both quantitative and qualitative components is depicted in Figure 5.

Figure 5

Quantitative and Qualitative Merged Data



Discussion

Overall Findings

The purpose of this convergent parallel mixed methods effectiveness study was to determine if and how CBMT can reduce fatigue of hospitalized patients on a BMT unit. The researchers measured various aspects of fatigue using the Multidimensional Fatigue Inventory (MFI; Smets et al., 1995). While quantitative results were not significant, descriptive data indicated that experimental participants tended to have more favorable CRF outcomes after receiving CBMT treatment. However, the sample size was small and readers are urged to utilize caution when generalizing results. Qualitative data results further supported CBMT with patients on a BMT unit by identifying three themes according to Braun and Clarke's (2006) six-phase thematic analysis. Participants reported that CBMT a) influenced fatigue cognitively by increasing motivation and self-efficacy, b) influenced fatigue affectively by promoting relaxation and restful states, and c) represented a meaningful, unique, and holistic service for hospitalized BMT patients. When merging the data, the quantitative and qualitative results tended to be congruent and the identified themes provided further contextual explanation and subjective understanding as to how CBMT affected the multidimensional aspects of fatigue for recovering BMT patients.

Although the quantitative results were not significant, the results were consistent with those of previous non-MT researchers who found that psychosocial interventions can improve hospitalized cancer patients' fatigue (Goedendop et al., 2009; Kangas et al., 2008). Additionally, PPLM within a CB approach can be an effective and multifaceted music therapy intervention on a BMT unit.

Anecdotal Evidence

The PI made several anecdotal observations that may provide implications for research and clinical practice. There were certain factors that prevented the PI from acquiring consent and collecting data as well as having a greater number of sessions with experimental participants. The PI was on the BMT unit weekdays from 2 to 5pm and the hours occasionally created a barrier as patients were often asleep, visiting with family or friends, reported exhaustion or not feeling well, or out of their rooms for a procedure. Additionally, patients' schedules and duration of hospital stay were constantly changing based from their conditions. The PI continued to keep constant and ongoing communication with the BMT registered nurses as well as physical therapist, occupational therapist, and chaplain to build a holistic and interdisciplinary understanding of patient progress and when a patient would be leaving the hospital in order to collect posttest data. Due to the extensive procedure of a BMT, patients' conditions can potentially be fatal, and the PI was sometimes unable to collect posttest data due to patients who expired. Death is a possible and realistic occurrence on a BMT unit, and music therapists working with this population should be sensitive towards individualized patient goals based from patients' values, contexts, challenges, preferences, and needs.

The PI also observed that a greater number of sessions with experimental participants seemed to lead to an improved working alliance. Enhanced therapeutic alliance may have led to greater participant engagement and involvement within sessions. Additionally, greater therapeutic and working alliance tended to reveal the unique and individual ways music could be used for each patient. For example, one participant

reported familiar and slower tempo songs helped him mentally slow down as he commented feeling "…a little healthier, a little more balanced to function at a lower RPM." In contrast, another participant reported faster, more active songs "kind of woke me up during the day" and that he favored more up-beat, familiar songs than the slower songs. One participant requested a limitation of verbal dialogue and prompts for physical interventions from the PI and asked to just listen to his preferred music while sitting or lying down. However, the participant still physically engaged in sessions through constant feet tapping to more up-beat, active songs and occasionally participated in vocal singing with the therapist. Although responses to MT tended to be positive, patients had idiosyncratic reactions to and desires in MT and the flexibility of the protocol allowed for the PI to meet each patient's needs in a manner congruent with her or his preferences and circumstances.

In order to continue exercise or greater movement outside of MT sessions, the PI created and provided a Daily Endeavor card after each MT session to experimental participants. The PI and an experimental participant would verbally discuss and develop a behavioral goal based off of the participant's current physical ability and the physical therapist or occupational therapist's daily goals for him or her. Due to the extensive procedures surrounding a BMT, participants' diminished mental and physical abilities resultant of CRF often prevented them from actively engaging or participating during or after the CBMT sessions. Most experimental participants did partake in the Daily Endeavor card but occasionally chose not to complete their goal due to the extent of their condition that day. The PI observed that the use of the Daily Endeavor card provided a structured generalization task and seemed to validate participants' for their successes in

completing their tasks. The use of the Daily Endeavor card also initiated productive dialogue concerning obstacles that prevented participants from accomplishing their assigned tasks. This conversation segued into the CBMT protocol and promoted a problem-solving discussion concerning both personal coping styles and finding illness management strategies. Since patients on a BMT unit are often confined to their rooms during hospitalization due to contact precautions, the Daily Endeavor card promoted movement or an intervention to direct their attention to while being confined to their room.

Implications for clinical practice consist of including as much autonomy to medical MT sessions as possible. In the current study, the researchers gave participants the option to choose preferred songs or genre of music within a CBMT session that may have been a key contributor to immediately improving dependent measures for experimental conditions. Additionally, infection control and sanitation precautions limited bringing in an array of instruments to possibly promote greater patient active music making with PPLM. Instrument playing would constitute movement and perhaps further reduce aspects of fatigue as exercise interventions showed positive outcomes on CRF (Adamsen et al., 2003; Kangas et al., 2005; Mock et al., 2001). For medical music therapists using active music engagement on the BMT unit, the researchers suggest small, easily sanitized, age appropriate instruments that patients can play utilizing a large range of motion. As CRF is a prevalent condition across all oncology units, this CBMT protocol may apply to other medical patients who experience fatigue. Other hospitalized populations with rehabilitative goals or extended hospital stays may benefit from adaptations and modifications of the protocol as well.

Limitations of the Current Study

Limitations of the current study can initiate with a relatively brief data collection period and limited length of working hours each day. This research was conducted in partial fulfillment of a masters' degree and data collection on the BMT unit was limited to ten weeks. Although the PI spent three to four hours on the unit each weekday, she was unable to offer all patients on the unit MT services and the opportunity to participate in the research study. A small sample size ($N = 11$) also contributed to the lack of statistical power in the quantitative analyses. Future researchers should strive for a larger participant sample size utilizing multi-site investigations to achieve a broader exploration as to whether a CBMT session using PPLM can positively affect aspects of fatigue for recovering and hospitalized BMT patients.

In the current effectiveness study, experimental participants received CBMT sessions for the duration of their hospital stay in an attempt to accurately reflect contemporary clinical practice. Previous music therapy researchers have typically investigated the immediate effects of single MT sessions. Immediate and short-term effects may only have a limited clinical relevance for hospitalized patients who experience negative psychosocial consequences over extended time periods (Cassileth et al., 2003). Patients on a BMT unit are often hospitalized from a few days to a few weeks. Concerning length of hospitalization, the BMT nurse manager in the current study reported that the mean stay on this unit was 19 days (C. Mielke, personal communication, March 13, 2013). Future investigators should continue to determine if treatment dose is related to treatment outcomes as well as how long beneficial effects of MT are maintained.

Another limitation included biased participants' responses that may have been resultant of the PI's dual role as a clinician and researcher. Future researchers might consider utilizing research assistants to provide treatment and measure treatment effects in an attempt to reduce or eliminate response biases.

Suggestions for Future Research

Suggestions for future systematic inquiry include increased and controlled doses of MT, a larger sample size, research assistants to collect data, and increased utilization of mixed methods designs. Due to the multifaceted nature of fatigue and diverse range of patient preferences, the use of mixed methods studies may provide a more in-depth understanding and exploration as to *if*, *how*, and *why* certain MT interventions might be effective with hospitalized patients on a BMT unit. Concerning the long-term effects of CRF after hospitalization, an additional follow-up measure or interview after a patient leaves the hospital setting may provide additional treatment information regarding MT effectiveness over a period of time. Future researchers might also examine medication consumption for fatigue management to explore if MT might reduce medication dose. As decreased medication usage is typically a central goal for medical facilities, MT as a complementary and alternative medicine to promote coping, manage negative symptoms, and reduce medication consumption might be an avenue for generating additional medical positions. Moreover, as higher levels of patient engagement and physical activity may have stronger treatment effects, future research encouraging hospitalized BMT patients to engage in exercise or active MT interventions is warranted. However, the experience of negative physical factors and the intensity of symptoms may reduce a patient's level of involvement (Burns et al., 2005; Gotay & Lau, 2002; Weber, Nuessler,

& Wilmanns, 1997; Zabora et al., 1997). Therefore, physical interventions should be approached with caution when dealing with CRF.

Conclusion and Summary

The purpose of this convergent parallel mixed methods effectiveness study was to determine if and how CBMT sessions can reduce fatigue of hospitalized patients on a BMT unit. While the sample size was small and generalizations of the quantitative results are inappropriate, posttest results indicated that participants tended to have favorable experiences in CBMT sessions. Themes from the qualitative analysis can be utilized to help clinicians refine interventions and research questions concerning how CBMT may affect various aspects of fatigue in hospitalized BMT patients. Future research is warranted to determine effective non-pharmacological and psychosocial treatments for hospitalized BMT patients addressing cancer-related fatigue.

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Appendix A

MULTIDIMENSIONAL FATIGUE INVENTORY
***** MFI-20 *****

Instructions:

By means of the following statements we would like to get an idea of how you have been feeling lately. There is, for example, the statement:

"I FEEL RELAXED"

If you think that this is entirely true, that indeed you have been feeling relaxed lately, please, place an X in the extreme left box; like this:

yes, that is true | | | | | | no, that is not true

The more you disagree with the statement, the more you can place an X in the direction of "no, that is not true". Please, do not miss out a statement and place one X next to each statement.

1. I feel fit	yes, that is true		no, that is not true
2. Physically I feel only able to do a little	yes, that is true		no, that is not true
3. I feel very active	yes, that is true		no, that is not true
4. I feel like doing all sorts of nice things	yes, that is true		no, that is not true
5. I feel tired	yes, that is true		no, that is not true
6. I think I do a lot in a day	yes, that is true		no, that is not true
7. When I am doing something, I can keep my thoughts on it	yes, that is true		no, that is not true
8. Physically I can take on a lot	yes, that is true		no, that is not true
9. I dread having to do things	yes, that is true		no, that is not true

10.	I think I do very little in a day	yes, that is true					no, that is not true
11.	I can concentrate well	yes, that is true					no, that is not true
12.	I am rested	yes, that is true					no, that is not true
13.	It takes a lot of effort to concentrate on things	yes, that is true					no, that is not true
14.	Physically I feel I am in a bad condition	yes, that is true					no, that is not true
15.	I have a lot of plans	yes, that is true					no, that is not true
16.	I tire easily	yes, that is true					no, that is not true
17.	I get little done	yes, that is true					no, that is not true
18.	I don't feel like doing anything	yes, that is true					no, that is not true
19.	My thoughts easily wander	yes, that is true					no, that is not true
20.	Physically I feel I am in an excellent condition	yes, that is true					no, that is not true

Thank you very much for your cooperation

Appendix B

Experimental Participant Interview Questions

Hilary A. Fredenburg, MT-BC, MTA
Michael J. Silverman, PhD, MT-BC

1. How did the music therapy activities help with the different aspects of your fatigue?
    -General fatigue?
    -Physical fatigue?
    -Activity level?
    -Motivation?
    -Mental fatigue?

2. How is music therapy different from other therapies, services, or treatments on the bone marrow transplant unit?

3. How is music therapy the same as other therapies, services, or treatments on the bone marrow transplant unit?

4. If you were talking with a friend, how would you describe music therapy services or treatment to them?

Appendix C

Participant Consent Form

Effects of Cognitive-Behavioral Music Therapy on Fatigue with Patients on a Blood and Marrow Transplantation Unit: A Convergent Parallel Mixed Methods Study.

You are invited to be in a research study of individual music therapy sessions on transplant recovery. You were selected as a possible participant because you are in the hospital recovering from a bone marrow transplant. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by: Hilary A. Fredenburg, a Board Certified Music Therapist and Music Therapy graduate student at the University of Minnesota, and Michael J. Silverman, director of music therapy at the University of Minnesota.

Background Information
The purpose of this study is to determine if and how cognitive-behavioral music therapy sessions can reduce fatigue of hospitalized patients on a blood and marrow transplant unit.

Procedures
If you agree to be in this study, you will be randomly assigned to 1 of 2 conditions. Conditions will include either:

Experimental
- Pretest – Music Therapy Session (every week day on BMT unit)
- Upon discharge: Music Therapy session – Posttest – Interview

Wait-list Control
- Pretest
- Upon discharge: Posttest – Music Therapy Session

Participants in experimental condition: The music therapist will discuss your recovery and your music preferences with you. Then she will engage you in a musical activity with verbal dialogue, including:
- Listening to or singing with her as she performs music you choose
- Movement to music

Each control session will include the pretest and/or posttest only, after which the music therapist will discuss your recovery and your music preferences with you. Then she will engage you in a musical activity, including:
- Listening to or singing with her as she performs music you choose

Risks and Benefits of being in the Study

This study only involves a minimal risk. The nurses and staff on the unit will be available should there be any problem, although this is not likely.

There is no direct benefit to subjects who participate in this study. Participation in the study offers free music therapy sessions. You may learn about relaxation, fatigue, and pain management techniques. There are no penalties if you decide to not participate.

Compensation

You will not receive payment for participating in this study. Choosing to not participate will not affect your treatment in any way.

Confidentiality

The records of this study will be kept private. When we publish results of this study, we will not include any information that will make it possible to identify a subject. Research records will be stored securely and only researchers will have access to the records, and subjects will only be identified by a number code. All computer files will be encrypted.

Voluntary Nature of the Study

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota or the Transplant Center. If you decide to participate, you are free to not answer any question or withdraw at any time with out affecting those relationships.

Contacts and Questions

The researchers conducting this study are: Michael J. Silverman, PhD, MT-BC and Hilary Fredenburg, MT-BC, MTA. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact them at School of Music, 612-624-1091, silvermj@umn.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

You will be given a copy of this information to keep for your records.

Statement of Consent

I have read the above information. I have asked questions and have received answers. I consent to participate in the study.

Please review the last sentence in the consent form to indicate that participation in the music therapy research session will imply informed consent to participate.

_____

Participant signature and date

Appendix D

Blood and Marrow Transplant Cognitive-Behavioral Music Therapy Protocol

Hilary A. Fredenburg, MT-BC, MTA
Michael J. Silverman, PhD, MT-BC

Before entering unit:

- Sterilize guitar
- Sterilize songbook cover
- Wash hands

Before entering patient rooms:

- Use anti-bacterial hand foam
- Use anti-bacterial foam on pen for informed consent signature

Miscellaneous:

- Never shake a patients hand or touch patient
- Remain at least 3 feet away from patient
- A maximum of 3 people may be present in the transplant room at one time
- MT treatment will end immediately if requested by patient
- MT treatment will last between 15-30 minutes, pending upon health status and desire of patient

Introduction to Therapist and Music Therapy

1. Introduce self
2. Explain referral for music therapy
    - The nurse provided a referral as they thought you may benefit from music therapy to help you cope with pain or provide relaxation
    - How are you feeling?
3. Explain purpose of research
    - To determine if music therapy can help patients who have received a bone marrow transplant
4. Explain informed consent
    - Your name and identity will remain confidential
    - Refusing to participate in research will not affect your treatment in any way
    - Participating in research is voluntary
    - Sign informed consent form

Cognitive-Behavioral Music Therapy Treatment Protocol

1. <u>Introduction</u>
    - Complete pretest: Multidimensional Fatigue Inventory (MFI-20)
        - The pretest will be completed verbally so patient does not have to touch pen/paper
    - Introduce Music Therapy and the benefits found for cancer patients

        - *Rational: To help patients understand the difference between music medicine versus music therapy work to implement music therapy treatment.*
    - Assessment:
        - Patient genre/song preferences
        - Patient pain: level and area perceived
        - Patient perceived level of tiredness, weariness, lethargy, etc. (fatigue)
            1. General Fatigue
            2. Physical Fatigue
            3. Reduced Activity
            4. Reduced Motivation
            5. Mental Fatigue

            **Informed by the MFI-20*

2. <u>Song + Rapport building</u>
    - Check-in with the patient's reported experience of their mind, body, and spirit.
    - Transition into next song: Therapist suggests to patient to mentally reflect/visualize during music.

3. <u>Song + Cognitive focus</u>
    - Mentally reflecting and visualizing positive memories, thoughts, feelings during live, patient-preferred music.
    - Therapist matches patient's mood and/or emotional status with music, rhythmic accompaniment, and intensity.
    - Patient and therapist verbally discuss patient's reflections/ideas during the song. Brainstorming collaborative ideas between the patient and therapist on how they can actively utilize music in their life, while in the hospital, and after their discharge to reduce the multiple aspects of fatigue.
        - Reinforce patient verbally where appropriate
        - *Rational: Meets individual needs focusing on the 5 aspects of fatigue from the MFI-20*
    - Handout given to patient on current oncology literature pertaining to non-pharmacological activities treating cancer-related fatigue.
    - Transition into next song: Therapist suggests doing physical movement to music.

4. <u>Song + Behavior focus</u>
    - Live, patient-preferred music provided with attention to physical body movement and rhythm [individually tailored based on daily exercises and physical therapy/team goals].
    - Focus on greater participation and movement to music.
        - *Rational: Creating new biological neurological pathways*
    - Transition to closing song: Review of session and validation for participation.

5. Song + Closure
    - Session summary processing
    - Live, patient-preferred music provided
    - Homework Task (Daily Endeavor Card) given to patient specified for patient generalization outside of music therapy sessions.

6. Complete posttest upon discharge
    - The posttest (MFI-20) will be completed verbally so the patient does not have to touch pen/paper.
    - Thank patient for participation and end treatment session.

Appendix E

Appendix F

Theme	Code	Total
Influenced Fatigue Affectively	Calming effect	6
	Reduced physical fatigue	2
	Relaxed Mental State	8
	Relaxed Physical & Mental State	4
	Rest the mind to rest the body	3
	Increased subjective effect	9
Total		**32**
Influenced Fatigue Cognitively	Active songs promote greater activity	3
	Greater cognitive effect than physical/behavioral	2
	Greater perceived amount of energy	5
	Increased alert state	3
	Increased functionality	4
	Increased internal motivation	10
	Increased physical response	6
	Maintained motivation level	1
	Physical high	1
	Increased sense of control	4
Total		**39**
MT is a Meaningful and Holistic Service	All services benefit the patient and are noticeable.	5
	All services involve and engage the patient	2
	Alleviated hospital routine	3
	Improved emotional, physical, mental wellbeing	8
	In support for MT treatment	9
	Looking forward to more MT sessions	1
	MT as a tool for improvement	8
	MT as non-stressful service/treatment	3
	MT as unique service/treatment	6
	Music as humanizing experience	1
	Music is meaningful to patients	3
	New treatment experience in hospital	1
	Positive experience	7
	Reduced isolation	2
	Refocus away from negative thoughts/ideas	3
Total		**62**
Grand Total		**133**